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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/230,069	04/25/2000	MORDECHAI SEGAL	299.004US2	4909

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EXAMINER
LUGO, DAVID B

ART UNIT	PAPER NUMBER
2634	

DATE MAILED: 12/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/230,069	Applicant(s) SEGAL ET AL.	
	Examiner David B. Lugo	Art Unit 2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 9/30/02 .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 26 November 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. This Office action, in response to Applicant's amendment filed on 9/30/02, is a final Office action.

Oath/Declaration

2. The declaration is defective because the signature of the second named inventor, Ofir Shalvi, is in pencil, and is therefore not in permanent ink, as required under 37 CFR 1.52(a).

Response to Arguments

3. Applicant's arguments filed 9/30/02 have been fully considered but they are not persuasive.

4. In response to applicant's argument that the cited references fail to teach the equalization of the received signal without the use of training data (i.e. blindly), Strolle explicitly teaches the use of blind equalization in column 3 line 6, as admitted by Applicant on page 7 of the amendment, and therefore is considered to meet the added claim limitation of an equalizer for reducing the noise and intersymbol interference in the signal "without the use of training data", as recited in independent claims 1, 16, 17 and 20. Further, the arguments pertaining to the claim rejections in view of Chennakeshu are addressed in the rejection stated below.

5. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir.

1992). In response, the motivation for each combination has indeed been described in each of the rejections stated below, and the specific portion of the reference providing the motivation is included therewith.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 3, 4, and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Strolle et al. U.S. Patent 5,550,596.

Regarding claims 1 and 20, Strolle discloses in Fig. 1 a front end unit comprising an input processor 12 that performs A/D conversion, splits the signal into quadrature I, Q components, performs a demodulation process and timing recovery (see col. 2 lines 42-53). Strolle further discloses a digital equalizer comprising a first filter and a second filter comprising DFE 22 for reducing ISI, and a converter recovering the digital information. Strolle also states that the system may use blind equalization (i.e. without training data) in column 3 line 6.

Further regarding claim 20, it is inherent that the receiver is part of a communications system further comprising a transmitter and a communications medium.

Regarding claims 3 and 4, Strolle further discloses a rotator 16, and states that the system may use blind equalization (i.e. without training data) in column 3 line 6.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 1, 7-15, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chennakeshu et al. U.S. Patent 5,283,811 in view of Nobakht et al. U.S. Patent 5,539,774.

Regarding claims 1 and 20, Chennakeshu discloses in Fig. 2, a communications system comprising a transmitter and a receiver with an input for receiving a modulated signal, a front end unit performing analog to digital conversion, demodulating the modulated analog signal to extract the digital information, performing timing control, and producing a demodulated complex-valued digital signal (see column 5 lines, 42-54). Chennakeshu further discloses in Fig. 3 a first filter for receiving the demodulated complex valued digital signal and a second filter (comprising DFE equalizer 40) that reduces the intersymbol interference. The first filter is considered to comprise the wire for transferring the demodulated complex valued digital signal to the second filter since it performs the function of the first filter as defined in the claim. The receiver is also considered to comprise a symbol-to bit converter for converting the detected symbols to the digital speech information processed by vocoder 16.

Chennakeshu does not disclose that the equalizer reduces the intersymbol interference without the use of training data.

Nobakht teaches the use of blind equalization for the purposes of removing intersymbol interference.

It would have been obvious to one of ordinary skill in the art to use the teaching of blind equalization disclosed by Nobakht in the equalizer of Chennakeshu in order to provide uninterrupted data transmission because there is no need to send a training sequence when incorrect decisions are made or the transmission channel characteristics change, as stated by Nobakht in column 3 lines 11-16.

Regarding claims 7-13, Chennakeshu further discloses the Complex Fast-Kalman Algorithm used to update tap coefficients in col. 8 line 10 - col. 9 line 34.

Regarding claim 14, Chennakeshu further discloses in Fig. 5 that the second filter further comprises an adaptive rotator 45 connected to the DFE equalizer 40, which comprises an adaptive feed forward equalizer (FFE equalizer 50 along with associated multipliers 54), a summation circuit 58 connected to the feed forward equalizer and to an adaptive filter (feedback filter 52 along with associated multipliers 54), the output of which is connected to update adaptive rotator, the feed forward equalizer, and the adaptive filter, as shown in Figs. 4 and 5. Chennakeshu further discloses a symbol detector 42 and that the adaptive filter is connected to the symbol detector.

Regarding claim 15, the signal is modulated according to a phase shift-keying format (see col. 5 lines 21-22).

Regarding claim 21, the receiver is used in a telephone network.

10. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chennakeshu et al. in view of Nobakht et al., as applied to claim 1 above, and further in view of White U.S. Patent 4,005,426.

Chennakeshu and Nobakht disclose all of the limitations of claim 2, except that the first filter operates to reduce the eigenvalue spread of the input signal.

White discloses an adaptive signal preprocessor that reduces eigenvalue spread, as stated in column 5 lines 40-44.

It would have been obvious to one of ordinary skill in the art to use a signal preprocessor that reduces eigenvalue spread as taught by White, in the receiver of Chennakeshu to allow the receiver to settle quickly, as stated by White in column 5 lines 40-44.

11. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al. in view of Ghosh U.S. Patent 5,572,262, White U.S. Patent 4,843,583, and Chennakeshu.

Strolle discloses in Fig. 1 a front-end unit comprising an input processor 12 that performs A/D conversion, splits the signal into quadrature components, and performs a demodulation process and timing recovery (see col. 2 lines 42-53). Strolle further discloses a pre-equalizer comprising a co-channel notch filter 18, a decision feedback equalizer comprising DFE 22, and a converter recovering the digital information. Strolle also states that the system may use blind equalization (i.e. without training data) in column 3 line 6.

Strolle does not expressly disclose that the pre-equalizer comprises an adaptive filter, a first summation circuit for producing a pre-equalized signal, a function circuit connected to the summer for producing a non-linear response to the pre-equalized signal, and an adaptation circuit for adjusting the filter taps.

Ghosh discloses a co-channel rejection filter in Fig. 5A comprising an adaptive filter 43, a summation circuit 41, where the taps of the adaptive filter are adjusted according to the output of the summation circuit.

White et al. disclose a non-linear function for adjusting filter taps in Fig. 1.

It would have been obvious to one of ordinary skill in the art to use the adaptive co-channel rejection filter taught by Ghosh in the receiver of Strolle in order to prevent situations that cause conditions undesirable for adjacent channel rejection, as stated by Ghosh in col. 3 lines 33-36, and to use a non-linear function as disclosed by White et al. to adjust the taps of the pre-equalizer to combat the problem of nonlinear distortion as stated by White et al. in column 1 lines 30-43.

Strolle further does not disclose that the decision feedback equalizer comprises a rotator, a feed forward equalizer, a second summation circuit, a symbol detector, and a second adaptive filter.

Chennakeshu discloses an equalizer comprising decision feedback equalizer comprising an adaptive rotator 45 connected an adaptive feed forward equalizer, a summation circuit 58 connected to the feed forward equalizer and to an adaptive filter that is connected to a symbol detector 42 which detects the symbols output from the summation circuit.

It would have been obvious to one of ordinary skill in the art to use the equalizer taught by Chennakeshu in the receiver of Strolle, Ghosh and White to reduce sensitivity to sample timing jitter, as stated by Chennakeshu in column 3 lines 66-68.

12. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al. in view of Ghosh.

Regarding claim 17, Strolle discloses in Fig. 1 a front-end unit comprising an input processor 12 that performs A/D conversion, splits the signal into quadrature components, and performs a demodulation process and timing recovery (see col. 2 lines 42-53). Strolle further

discloses a pre-equalizer comprising a co-channel notch filter 18, an equalizer comprising DFE 22 for reducing ISI, and a converter recovering the digital information. Strolle also states that the system may use blind equalization (i.e. without training data) in column 3 line 6.

Strolle does not expressly disclose that the pre-equalizer comprising the co-channel notch filter is adaptive.

Ghosh discloses an adaptive co-channel rejection filter in Fig. 5A.

It would have been obvious to one of ordinary skill in the art to use the adaptive co-channel rejection filter taught by Ghosh in the receiver of Strolle in order to prevent situations that cause conditions undesirable for adjacent channel rejection, as stated by Ghosh in col. 3 lines 33-36.

Further, Strolle does not expressly disclose that the quadrature components are derived by multiplying the digital signal with sine and cosine signals. However, one of ordinary skill in the art would recognize that the splitting of the signal into quadrature components may be performed by multiplying the digital signal with sine and cosine signals to extract the quadrature information.

13. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al. in view of Ghosh as applied to claim 17 above, and further in view of White et al. U.S. Patent 4,843,583.

Regarding claim 18, Ghosh further discloses that the adaptive pre-equalizing step further comprises adaptively filtering the input signal, summing the input with the output from the filter, and modifying the taps of the filter in response to the input and the output form the summer.

Strolle and Ghosh do not expressly disclose that a non-linear response is generated for the adjustment of the filter taps.

White et al. disclose a non-linear function for adjusting filter taps in Fig. 1.

It would have been obvious to one of ordinary skill in the art to use a non-linear function as disclosed by White et al. to adjust the taps of the pre-equalizer disclosed by Strolle-Ghosh to combat the problem of nonlinear distortion as stated by White et al. in column 1 lines 30-43.

14. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al. in view of Ghosh as applied to claim 17 above, and further in view of Chennakeshu et al.

Strolle and Ghosh disclose all of the limitations of claim 19 except that the adaptive equalizing step comprises adaptively rotating the pre-equalized signal, adaptively filtering the rotated signal to produce a filtered rotated signal, summing the filtered rotated signal with an adaptive filter output to produce an adapted complex-valued signal, detecting the symbols in the adapted complex-valued signal to produce a corrected complex-valued symbol signal, and producing the adapted filter output by adaptively filtering the corrected complex valued symbol signal.

Chennakeshu discloses an equalizer comprising an adaptive rotator 45 connected to a DFE 40, which comprises an adaptive feed forward equalizer, a summation circuit 58 connected to the feed forward equalizer and to an adaptive filter that is connected to a symbol detector 42 which detects the symbols output from the summation circuit.

It would have been obvious to one of ordinary skill in the art to use the equalizer taught by Chennakeshu in the receiver of Strolle and Ghosh to reduce sensitivity to sample timing jitter, as stated by Chennakeshu in column 3 lines 66-68.

15. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al. in view of White et al. U.S. Patent 4,843,583.

Strolle discloses that the system uses blind equalization (i.e. without training data) in column 3 line 6, but fails to disclose that the feedback network of the second filter is non-linear.

White et al. disclose a non-linear function for adjusting filter taps in Fig. 1.

It would have been obvious to one of ordinary skill in the art to use a non-linear function as disclosed by White et al. to adjust the taps of the pre-equalizer disclosed by Strolle to combat the problem of nonlinear distortion as stated by White et al. in column 1 lines 30-43.

16. Claims 6 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al.

Regarding claim 6, Strolle discloses that the first filter (feed-forward equalizer 14) is an FIR filter, considered to comprise L taps, but does not expressly disclose that the taps are adjusted so that the output power is minimized.

However, it would have been obvious to one of ordinary skill in the art to minimize the output power to reduce energy consumption thereby reducing costs.

Regarding claim 22, Strolle fails to disclose that the receiver is used in a coaxial cable television infrastructure.

However, it would have been obvious to one of ordinary skill in the art to employ the receiver of Strolle in a coaxial cable television infrastructure because coaxial cable is a well-tested and proven communication medium.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **David B. Lugo** whose telephone number is **(703) 305-0954**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Stephen Chin**, can be reached at **(703) 305-4714**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

David B. Lugo
Patent Examiner

12/9/02

STEPHEN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600